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ABSTRACT

This report discusses the Pennsylvania State University Instruction Support System (ISS) designed to meet the needs of large classes for competency-based teacher education (CBTE) programs. The ISS seven-step hierarchical developmental procedure is reported to free the instructor for specialized instruction and evaluation by utilizing a modification of computer-assisted instruction (CAI) with computer-managed instruction (CMI). General response from students and instructors was favorable. An analysis of student reaction to computer-based instruction in language education is included. (JS)

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Summary

# AN INSTRUCTION SUPPORT SYSTEM FOR COMPETENCY-BASED PROGRAMS

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Changing instruction methods from lecture-discussion and other group-oriented processes to individualized methods has demonstrated to educators the urgent need for record-keeping and communication systems. Nowhere is this need more evident than in the Competency-Based Teacher Education (CBTE) program. A common characteristic of CBTE programs is demand for overt, measurable demonstration of skills and/or competencies definitive to the field of teacher education. In turn, that demand calls for using multiple performance measurements and close supervision of individual progress of student performance.

At Penn State University a pilot Instruction Support System (ISS) was designed to meet the needs of large-sized classes for the emerging CBTE programs. The purpose of this paper is to describe briefly ISS as it has been used with one such undergraduate course in the teaching of children's literature; and to report on the reaction of students to the combination of an individualized competency-based method of instruction and evaluation and a computer-based support system.

Language Education 441, Teaching Children's Literature in the Elementary School, is an individualized competency-based course in the teacher preparation program at Penn State which has been faced with high enrollments and minimal instructor time. By definition, an individualized competency-based course calls for multiple individual self-paced opportunities to enable the student to reach criterion. In Language Education 441, a three-credit course, this means that criterion performance must be reached by approximately 150 students within the constraint of a ten-week time period. This particular course has a performance demonstration demand on 39 separate competencies, subdivided into seven modules or units, and each built on a hierarchal order of objectives enabling the student to reach each of the 39 competencies. Each objective necessarily has a performance measurement to assess achievement of a competency-based criterion. Fourteen different types of performance measurements are used to assess student performance on the competency objectives.

In addition to the instruction and evaluation of each competency, it was found necessary for the instructor to carry out the following tasks: 1) computation of a total score for each student on each of 39 competencies by adding part scores and comparing with a criterion, 2) give each student daily evaluation feedback on attempted objectives, 3) keep a record of the repeated attempts at competency by each student, 4) give each student continuous weekly progress reports relative to all competencies, and 5) compute a final score on each of the 39 competencies, as well as the combination of all competencies, thereby arriving at a "grade" for the traditional college transcript.

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It soon became obvious that the above tasks which were defined for such an individualized competency-based course would be impossible for an instructor with large groups of students. The Instruction Support System (ISS) was developed to meet such needs as described. The chief model used in developing ISS was the Automated Instruction Management System (AIMS) developed at New York Institute of Technology and reported by O'Dierno, et al.[1] AIMS leans very heavily on the multiple-choice test as the student assessment procedure. Our need was for a computer-based tool that would respond to a wider variety of student competency assessment procedures resulting in the gradual development of ISS.

ISS calls for the following hierarchal developmental procedures:

1) Identification of desired competencies.
2) Delineation of competencies in terminal behavioral objective format.
3) Identification of a performance measure to assess competency for each objective.
4) Identification of prescriptions compatible with the performance measures.
5) Development of an automated evaluation procedure compatible to the measuring instruments.
6) Development of an automated, customized feedback system definitive to each course.
7) Development of a student feedback retrieval system.

Most student competency assessment in Language Education 441 calls for initial on-site instructor evaluation for student overt behaviors which are fed into ISS. Six of the 39 objectives, however, call for a demonstration of certain knowledge of fundamentals of children's literature. This knowledge is evaluated by a separate computer assisted instruction plan. Each student must demonstrate the competency of possession of a basic frame-of-reference, and primary source data bank of the fundamentals of children's literature in support of intergroup education. To this end, examinations have been written for each of the six competencies and have been placed in computer storage. The student takes an examination as many times as needed in order to reach competency within the constraint of the ten-week period. Each test of approximately 40 questions is generated for each student individually from a large test item pool. The random number generator in this computer operating system makes a new selection from the pool each time the student requests a test on fundamentals. Immediate feedback in reference to that competency is given the student at the time the test is finished, and the assessment of the performance is in turn fed into ISS for adding to the individual total performance record. Thus, we have combined a modification of computer assisted instruction (CAI) with computer managed isntruction (CMI) in a single course in order to give the instructor a maximum amount of time for interaction with individual students.

After several months of learning how to make ISS work for the instructor, we assessed the students' reactions to ISS in terms of the following eight questions, with the results as shown in Table 1.

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[1] O'Dierno, E. A. A progress report on the development of a generalized educational management system. Advanced Systems Laboratory, New York Institute of Technology, 1969.

TABLE 1

Student Reaction to Computer-Based
Instruction Support System
Applied to Language Education 441

| | Pilot Study Summer '74 N = 44 | | Regular class Fall '74 N = 122 | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| 1) In general, do you feel that the computer feedback system was a helpful part of this course? | 91 | 9 | 77 | 23 |
| 2) Do you think the computer progress reports of an individual student's work were an asset to this course? | 93 | 7 | 89 | 11 |
| 3) Would you be inclined to enroll in another course which utilized this system as a technique for providing daily and weekly evaluation summaries? | 84 | 16 | 84 | 16 |
| 4) Do you think the competency-based philosophy and the automated feedback system provided a fair grading system? | 93 | 7 | 81 | 19 |
| 5) Did you ever submit any objectives more than once? | 89 | 11 | 96 | 4 |
| 6) Did the prescriptions provided by the computer help you to subsequently achieve competency? | 79 | 21 | 60 | 40 |
| 7) A claim for the use of a computer feedback system is that it frees the instructor for individual evaluations necessary in a competency-based course. Do you feel you have had more individual evaluation in this course as opposed to courses not using such a feedback system? | 50 | 50 | 66 | 34 |
| 8) Do you think the computer feedback system enabled you to achieve at a higher level than you would have using traditional methods? | 35 | 65 | 58 | 42 |

(Percentage figures)

The following inferences can be made from the data. The high proportion of "Yes" responses to the first three questions shows that students were very favorable to ISS. The favorable responses to Questions 4, 5, and 6 indicate that the use of a computer-based instruction support system for large group individualized instruction is well received by the students. Reaction to Question 7 is puzzling in that each student was individually evaluated a minimum of 39 times (not counting repeated attempts). In response to Question 8, the "Yes" answers are encouraging. Unfortunately, a negative response does not discern the student's feelings relative to achievement at a level the same as or lower than a traditionally taught course. Taking the overall concensus using CMI and CAI with an individualized competency-based teacher preparation program, it can be said that the general response of both students and instructors is very favorable.

The approximate cost for daily printouts from ISS per 100 daily transactions is $2 per day. At present Penn State has one course utilizing weekly progress reports in addition to the daily printouts. This weekly printout cost depends on the number of students. At present the one course utilizing this procedure has 200 students enrolled. A duplicate set is printed each week, one for the student and one for the instructor and its operating cost for these 200 students is approximately $6 per week.

Computer-managed instruction in the form of ISS at The Pennsylvania State University is operating efficiently and effectively. Both students and instructors who are dedicated to quality instruction have found ISS indispensable to quality large group individualized instruction.